

REMARKS

Claims 1, 2, 4-15, 17-19 and 21-32 were previously pending in this application and claims 1, 27, and 31 are amended herein. Claims 1, 2, 4-15, 17-19 and 21-32 are rejected under 35 U.S.C. §112. Claim 26 is rejected under 35 U.S.C. §102(b) and claims 1, 2, 4-15, 17-19, 21-25, and 27-32 are rejected under 35 U.S.C. §103(a). Applicant respectfully traverses each of these rejections. The application as presented is believed to be in condition for allowance.

Initially, Applicant thanks Examiner Abel-Jalil for the courtesies extended during the telephone interview of November 15, 2005, the substance of which is summarized herein. On November 14, 2005, Applicant e-mailed a proposed interview agenda to the Examiner. To ensure that the record is complete, Applicant submits herewith a copy of the November 14 e-mail and the proposed interview agenda.

Rejections under 35 U.S.C. §112

The Office Action rejected claims 1, 2, and 4-14 asserting that the term “can be used” is an “optional use term and therefore is indefinite.” *See* Office Action, page 2, ¶4. Applicant respectfully disagrees.

During the telephone interview, Applicant pointed out that the term “can be used” defines a specific characteristic of an ELVID (i.e., that the ELVID is capable of being used to access one of the plurality of logical volumes on at least two of the plurality of storage systems) and does not recite an optional use of an ELVID. In view of this explanation, the Examiner agreed to withdraw the rejection under §35 U.S.C. §112, second paragraph.

Accordingly, it is respectfully requested that the rejection of claims 1, 2, and 4-14 under 35 U.S.C. §112 be withdrawn.

Rejection Under 35 U.S.C. §102

The Office Action rejected claim 26 under 35 U.S.C. §102(b) as purportedly being anticipated by Baranovsky (5,897,661). Applicant respectfully traverses this rejection.

Baranovsky fails to disclose or suggest, “an enterprise logical volume identifier (ELVID) interface module to transmit an access request for at least one of a plurality of logical volumes over a network, **the access request including an ELVID for the at least one of the plurality of**

logical volumes and a respective physical storage location on one of a plurality of storage systems, the ELVID uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems.”

As discussed during the telephone interview, Baranovksy fails to disclose or suggest transmission of an access request that includes both a logical volume identifier for a requested logical volume and the physical storage location of the logical volume. Baranovsky discloses that higher level services such as file systems and data managers access data with a logical volume using a relative block address, which is a sector number relative to the origin of the logical volume (Col. 13, lines 33-37). A logical volume manager translates the relative block address to a physical sector number on a physical volume (i.e., a disk) (Col. 13, lines 38-40). The physical sector number may then provided to the physical volume which may retrieve the data stored at the identified sector.

Thus, in Baranovksy, there is no transmission of an access request that includes both a logical volume identifier and physical storage address for the logical volume. Rather, the higher level service transmits an access request that includes only a logical address (i.e., a relative block address). The logical volume manager receives this access request, translates the relative block address to a physical address and then sends another access request to the physical volume that includes only a physical address (i.e., the physical sector number), but no logical volume identifier.

Further, Baranovsky fails to disclose or suggest, “an ELVID uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems.” The Office Action asserts that each storage device (i.e., physical volume) of Baranovsky is a storage system and the logical volume identifiers are unique among all the physical volumes in a physical volume group. *See* Office Action, pages 18-19. Even if the storage devices of Baranovsky are properly interpreted as storage systems (which Applicant does not concede), Baranovsky still does not disclose an ELVID that is unique among a plurality of logical volumes.

The logical volume identifier in Baranovksy is not unique among all of the logical volume identifiers because a logical volume identifier is unique only within a physical volume group (Col. 12, lines 19-25). Thus, two logical volumes in different physical volume groups may have the same logical volume identifier.

As should be appreciated from the foregoing, Baranovsky fails to disclose or suggest a module that transmits an access request including any type of logical volume identifier for the at least one of the plurality of logical volumes and a respective physical storage location on one of a plurality of storage systems, and certainly does not disclose or suggest transmitting a logical volume identifier that is “an ELVID uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems.”

Thus, claim 26 patentably distinguishes over Baranovksy. Accordingly, it is respectfully requested that the rejection of claim 26 under 35 U.S.C. §102(b) be withdrawn.

Rejections Under 35 U.S.C. §103

The Examiner rejected claims 1, 2, 4-15, 17-19, 21-25, and 27-32 under 35 U.S.C. §103(a) as purportedly being unpatentable over Baranovsky in view of Hubis (6,343,324). Applicant traverses this rejection and respectfully points out that the Office Action has failed to establish a *prima facie* case of obviousness for two reasons. First, one of skill in the art would not have been motivated to combine the references in the manner suggested in the Office Action. Second, even if one would have been motivated to combine the references in the manner alleged, the claims patentably distinguish over any such combination.

There Is No Motivation To Combine The References

Hubis discloses a method for controlling access to a shared storage device, such as a disk drive storage array (Abstract). As shown in Figure 1, the system limits access to a volume of storage 108 on, or controlled by, the array controller 104 to a specific set of host computers 101, as identified by a unique identifier (for example, the world wide name (WWN) 107 associated with the host computer 101 via its network interface) (Col. 4, lines 48-52). A host is allowed

access to a volume based on information stored in a host WWN list, volume WWN tables, and volume permission tables (Col. 9, lines 1-4). As shown in Figures 2B-3, a particular logical volume of an I/O processor associated with a controller includes a volume permission table (190) that identifies, for a particular host index in the volume WWN table, whether the host is granted access to that particular logical volume (Col. 11, lines 1-7).

The Office Action asserts that one of skill in the art would have been motivated to modify the system of Baranovsky, based on the purported teaching of Hubis, to include, "in response to the access request, verifying that the one of the plurality of logical volumes corresponding to the ELVID is stored on the one of the plurality of storage systems specified in the physical storage address because it provides for security and to avoid error and corruption of information." (See Office Action, page 5, lines 17-22). Applicant respectfully disagrees.

As discussed above, Baranovsky is directed to a system having only a single computer. As shown in Figure 5, a user of the computer accesses data stored in logical volumes by opening a file in a file system. The file system then maps this file to a logical storage location in a particular logical volume. The logical volume manager then maps this logical storage location to a particular physical storage location or set of storage locations. Thus, an access request to the logical volume manager specifies only a location within a particular logical volume and does not specify the corresponding physical storage location. The logical volume manager determines, by itself, what physical storage location corresponds to the requested logical storage location.

Thus, in Baranovsky there is no need (and in fact it is impossible) to verify that the logical volume identified in the access request is stored in the physical storage location specified in the access request because there is no physical storage location specified in the access request. Thus, one of skill in the art would not have been motivated to modify the system of Baranovsky to perform a step of "verifying that the one of the plurality of logical volumes corresponding to the ELVID is stored on the one of the plurality of storage system specified in the physical storage address," as purportedly taught by Hubis, because in the system of Baranovsky there is no physical storage address specified in an access request that the system may verify.

The Office Action further asserts that one skilled in the art would have been motivated to modify the system of Baranovsky, based on the teaching of Hubis, to use an ELVID to assure that an entity requesting access to the one of the plurality of logical volumes is authorized to do

so because it provides for security and to avoid error and corruption of information (*See* Office Action, page 9, lines 13-17). Applicant respectfully disagrees.

As discussed above, Baranovsky is directed to a single general purpose computer that is intended for use by a single user who is operating the computer. For example, as shown in Figure 1 of Baranovsky, the computer includes a keyboard 24, a mouse 26, a joystick 32, and a display 38 that allows the user to provide input to the computer and view output from the computer. Because the computer of Baranovsky is intended for use by a single user sitting at the terminal, there would have been no reason to incorporate the access permissions scheme for controlling access to logical volumes by multiple users into the system of Baranovsky. Thus, one of skill in the art would not have been motivated to modify the system of Baranovsky to include the access permission verification techniques taught by Hubis.

For the foregoing reasons, one of skill in the art would not have been motivated to modify the system Baranovsky based on the teachings of Hubis in the manner alleged in the Office Action. Thus, the Office Action has failed to establish a *prima facie* case of obviousness and it is respectfully requested that the rejection of claims 1, 2, 4-15, 17-19, 21-25, and 27-32 under 35 U.S.C. §103(a) be withdrawn.

The Claims Distinguish Over Any Combination Of Baranovsky and Hubis

Even if one were to combine Baranovsky and Hubis, Applicant's claims still patentably distinguish over any such combination.

Claim 1

Claim 1 is directed to a method of accessing one of a plurality of logical volumes stored on a plurality of storage systems in an enterprise, the one of the plurality of logical volumes being stored on at least one of the storage systems. The method comprising steps of: receiving from a host computer an access request to access data stored on the one of the plurality of logical volumes, the access request specifying an enterprise logical volume identifier (ELVID) for the one of the plurality of logical volumes and a physical storage address for the one of the plurality of logical volumes, wherein the ELVID uniquely identifies the one of the plurality of logical volumes among the plurality of logical volumes, so that the ELVID can be used to access the one

of the plurality of logical volumes on at least two of the plurality of storage systems, and wherein the physical storage address specifies one of the plurality of storage systems in the enterprise; and in response to the access request, verifying that the one of the plurality of logical volumes identified by the ELVID provided in the access request is stored on the one of the plurality of storage systems specified in the physical storage address provided in the access request.

As should be clear from the discussion above, Baranovsky does not disclose or suggest an ELVID that “uniquely identifies the one of the plurality of logical volumes among the plurality of logical volumes, so that the ELVID can be used to access the one of the plurality of logical volumes on at least two of the plurality of storage systems, and wherein the physical storage address specifies one of the plurality of storage systems in the enterprise.” Hubis does not cure this infirmity of Baranovsky, as Hubis fails to disclose a logical volume identifier that is unique with respect to any other one of the plurality of logical volumes stored in the system.

In addition, neither reference discloses or suggests, “verifying that the one of the plurality of logical volumes identified by the ELVID provided in the access request is stored on the one of the plurality of storage systems specified in the physical storage address provided in the access request.” During the telephone interview, Applicant pointed out that Hubis relates to authenticating access permissions (i.e., determining if a host computer has permission to access a shared disk drive). Applicant pointed out that claim 1 relates to receiving an access request that specifies an ELVID and a physical location at which the logical volume identified by the ELVID is believed by the host to be located and verifying that the logical volume is actually stored at the physical location.

The Examiner agreed that this verification is different from the access permission checking disclosed in Hubis but questioned whether this was made clear in the claim. The Examiner suggested that the claim be amended to make explicit that the verification is performed on the ELVID provided in the access request and the physical location provided in the access request. Claim 1 has been so amended.

In view of the foregoing, claim 1 patentably distinguishes over any combination of Baranovsky and Hubis. Accordingly, it is respectfully requested that the rejection of claim 1 under 35 U.S.C. §103(a) be withdrawn for this additional reason.

Claims 2 and 4-14 depend from claim 1 and are patentable for at least the same reasons.

Claim 15

Claim 15 is directed a method of accessing one of a plurality of logical volumes stored on a plurality of storage systems in an enterprise, the one of the plurality of logical volumes being stored on at least one of the storage systems. The method comprises steps of: receiving from a host computer an enterprise logical volume identifier (ELVID) for the one of the plurality of logical volumes; receiving from the host computer a physical storage address for the one of the plurality of logical volumes; and using the ELVID to assure that an entity requesting access to the one of the plurality of logical volumes is authorized to do so, the ELVID uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems.

As should be clear from the discussion above, neither Baranovsky nor Hubis discloses or suggests receiving an ELVID “uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems,” as recited in claim 15.

Further, during the telephone interview, Applicant discussed that while Hubis relates to controlling access to shared storage, such access control is not performed using an ELVID. Thus, Hubis does not disclose or suggest, “using the ELVID to assure that an entity requesting access to the one of the plurality of logical volumes is authorized to do so,” as recited in claim 15.

Thus, claim 15 patentably distinguishes over any combination of Baranovsky and Hubis. Accordingly, it is respectfully requested that the rejection of claim 15 under 35 U.S.C. §103(a) be withdrawn for this additional reason.

Claims 17-19 and 21-25 depend from claim 15 and are patentable for at least the same reasons.

Claim 27

Claim 27 is directed to a storage system for use in an enterprise comprising a plurality of storage systems coupled by a network, the plurality of storage systems to store a plurality of logical volumes. The storage system comprises: an input for receiving an access request that includes an enterprise logical volume identifier (ELVID) for a logical volume and a physical storage address that identifies one of the plurality of storage systems; a storage medium to store data corresponding to the plurality of logical volumes; and an ELVID verifier module to verify that the logical volume identified by the ELVID indicated in the access request is stored on the one of the plurality of storage systems identified in the physical storage address indicated in the access request, the ELVID uniquely identifying the correct one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the correct one of the plurality of logical volumes on at least two of the plurality of storage systems.

As should be clear from the discussion above, neither Baranovsky nor Hubis discloses or suggests an ELVID “uniquely identifying the correct one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the correct one of the plurality of logical volumes on at least two of the plurality of storage systems” or “an ELVID verifier module to verify that the logical volume identified by the ELVID indicated in the access request is stored on the one of the plurality of storage systems identified in the physical storage address indicated in the access request,” as recited in claim 27.

Thus, claim 27 patentably distinguishes over any combination of Baranovsky and Hubis. Accordingly, it is respectfully requested that the rejection of claim 27 under 35 U.S.C. §103(a) be withdrawn for this additional reason.

Claim 28 depends from claim 27 and is patentable for at least the same reasons.

Claim 29

Claim 29 is directed to a storage system for use in an enterprise comprising a plurality of storage systems coupled by a network, the plurality of storage systems to store a plurality of logical volumes. The storage system comprises: a storage medium to store data corresponding to the plurality of logical volumes; and an enterprise logical volume identifier (ELVID) authorization module to verify that an access request to a physical storage location on the storage

medium is received from an entity permitted to access one of the plurality of logical volumes with a corresponding ELVID, the ELVID uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems.

As should be clear from the discussion above, neither Baranovsky nor Hubis discloses or suggests an ELVID “uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems,” or “an enterprise logical volume identifier (ELVID) authorization module to verify that an access request to a physical storage location on the storage medium is received from an entity permitted to access one of the plurality of logical volumes with a corresponding ELVID,” as recited in claim 29.

Thus, claim 29 patentably distinguishes over any combination of Baranovsky and Hubis. Accordingly, it is respectfully requested that the rejection of claim 29 under 35 U.S.C. §103(a) be withdrawn for this additional reason.

Claim 30 depends from claim 29 and is patentable for at least the same reasons.

Claim 31

Claim 31 is directed to a computer system comprising: at least one host computer; a plurality of storage systems that store a plurality of logical volumes; means for receiving an access request to access data stored on one of the plurality of logical volumes, the access request specifying an enterprise logical volume identifier (ELVID) for the one of the plurality of logical volumes and a physical storage address for the one of the plurality of logical volumes that identifies one of the plurality of storage systems; and means for verifying that the one of the plurality of logical volumes identified by the ELVID indicated in the access request is stored on the one of the plurality of storage systems identified in the physical storage address indicated in the access request, the ELVID uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems.

As should be clear from the discussion above, neither Baranovsky nor Hubis discloses or suggests an ELVID “uniquely identifying the one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the one of the plurality of logical volumes on at least two of the plurality of storage systems” or “means for verifying that the one of the plurality of logical volumes identified by the ELVID indicated in the access request is stored on the one of the plurality of storage systems identified in the physical storage address indicated in the access request,” as recited in claim 31.

Thus, claim 31 patentably distinguishes over any combination of Baranovsky and Hubis. Accordingly, it is respectfully requested that the rejection of claim 31 under 35 U.S.C. §103(a) be withdrawn for this additional reason.

Claim 32

Claim 32 is directed to a computer system comprising: at least one host computer; a plurality of storage systems that store a plurality of logical volumes; and means for verifying that access requests to the plurality of logical volumes using an associated enterprise logical volume identifier (ELVID) are made by an entity authorized to access a requested one of the plurality of logical volumes, the ELVID uniquely identifying the requested one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the requested one of the plurality of logical volumes on at least two of the plurality of storage systems.

As should be clear from the discussion above, neither Baranovsky nor Hubis discloses or suggests an ELVID “uniquely identifying the requested one of the plurality of logical volumes among the plurality of logical volumes and being usable to access the requested one of the plurality of logical volumes on at least two of the plurality of storage systems,” or “means for verifying that access requests to the plurality of logical volumes using an associated enterprise logical volume identifier (ELVID) are made by an entity authorized to access a requested one of the plurality of logical volumes,” as recited in claim 32.

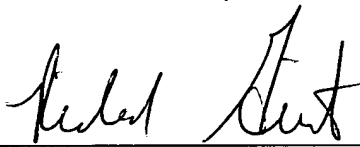
Thus, claim 32 patentably distinguishes over any combination of Baranovsky and Hubis. Accordingly, it is respectfully requested that the rejection of claim 32 under 35 U.S.C. §103(a) be withdrawn for this additional reason.

CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,
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